Intertainment

Interactive TV Services on Mobile Devices.

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ABSTRACT

Traditional TV provides only a very passive experience. Recent trends suggest that users would be interested in taking a more active role while watching TV. This demo paper presents the Interactive television (iTV) platform, which offers a solution in giving the TV-audience a chance of active participation. The iTV platform enriches TV with additional content and interactivity, making it more attractive for the audience. In order to support multi-user and personalized access to the iTV services mobile devices are used. To provide an easy way to offer and use services an ad-hoc service architecture - the Universal Plug and Play (UPnP) architecture - has been used.

1. INTRODUCTION

The recent digitalization of television creates new opportunities to enhance the television experience. The Electronic Program Guide (EPG) - though still very limited - gives a first impression of the possibilities of future technologies. iTV will provide various possibilities for interaction. The combination of digital TV and modern set-top boxes has a great potential for facilitating the deployment of new innovative services e.g. interactive game shows and voting. In this context, we developed a prototypical platform for iTV services. The platform uses mobile devices to support multi-user and personalized access. To connect mobile devices to the set-top box, ad-hoc mechanisms are used. Existing Home network environments can be used to establish this connection. Moreover, the use of ad-hoc service architectures also enables inexperienced users to access and to use the services without having to worry about configuration.

We demonstrate a prototypical implementation of an iTV service platform. Based on this platform, we implemented a service which allows synchronizing additional content with a TV program. The platform has a large number of use cases. The following two are presented in the demo:

The quiz show scenario: The members of a family may participate in a quiz show competition using their own personal devices like smart phones or handhelds. Synchronized with the TV show, each participant answers a series of questions. This scenario allows the users to compete with each other by answering the quizshow-questions synchronously to the progress of the show on different devices. In addition, the scores can be uploaded to a game-server.

The newsticker scenario: The iTV platform enables users to gather additional information synchronously to the presentation of the newsticker topics by using their own mobile devices.

2. DESCRIPTION OF THE SYSTEM

The iTV platform is mainly implemented in JAVA, which makes the system platform independent. The platform is divided into two parts: the service provider side and the service consumer side. This distinction stems from the principles of the ad-hoc service architecture - the UPnP architecture [1] - that forms an important part of the system. The service provider side is composed of UPnP devices and services which offer their functionality in the home network environment. The service consumer side in the system - the user with his mobile device - uses a UPnP Controlpoint to discover the services and to take control of them. In short, UPnP can be described as an extension of the Plug and Play concept for the networks. The main advantage of UPnP is that offered services can be used without requiring any further configuration. The middleware hides the whole complexity as well as the heterogeneity of the system and of the home environment. Based on this architecture, a service for interactive TV and a Controlpoint have been developed for the demo to provide the intended interactivity.

Our iTV platform is the first platform that makes use of the UPnP architecture for interactive TV services. An important feature of the iTV platform is its support of many different types of mobile devices: smartphones, handhelds, UMPCs, and others. Compared to other systems that offer interactivity like MHP [4], the interactivity in iTV not restricted to the TV set-top boxes, but also available to the personal devices of the users. This allows the ITV platform to support multi-user access. A personalized version of the iTV platform is also available. The components in figure 1 are divided into two main parts – the service consumer components and the service provider components. In the following sections every component will be described briefly.
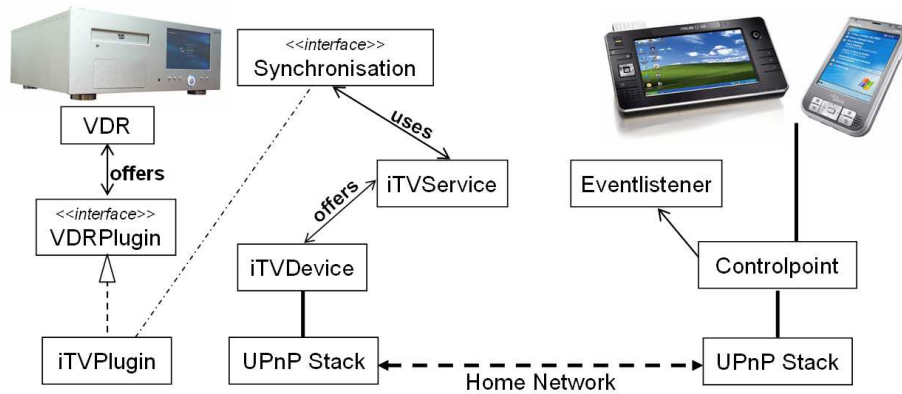
Figure 1: Overview of the iTV demonstration platform.

2.1 Service Provider Components

- Video Disk Recorder (VDR)[3]: We use this external open source media center program to link the TV content to the other system components. In general, any extendable media center software can be used.

- iTVPlugin: This component is developed as an implementation of the plugin interface of the VDR. Its main purpose is to build the synchronization timestamps based on timestamps of the MPEG-2 Transport Stream [2]. These timestamps are forwarded to the iTV device via a local socket connection.

- iTVDevice: This device is the first component in the UPnP framework in the system. It represents a UPnP Rootdevice and offers UPnP functions such as announcing the device and its services in the network, responding to search requests, sending event messages on state changes and controlling the device. The device forms a container for the service which is defined by the UPnP standard.

- iTVService: The iTVService implements the major part of the iTV functionality. Within this service, the synchronization information is processed and linked to the corresponding content. The additional content describes the presentation and interactivity of the different events. To this end, we provide an XML based description that can be broadcasted or provided separately. Each additional content has an event type, a value, a start time and an end time. The duration of a scene is defined by its start and end time. The system makes use of several event types, which correspond to different purposes. The event types are divided into two main categories - "scene-related" and "scene-restricted" events. The content of a "scene-restricted" event is valid only for the current scene, for example the current question of a quizshow. A "scene-related" content corresponds to the current scene, but remains valid afterwards, for example additional information on a news-ticker topic.

- PresentationPageHandler: A UPnP device can be presented and controlled through a presentation page.

The iTV presentation page offers a webpage with a short description of the iTVService.

- UPnP Stack: The Stack implements the functionality of the UPnP framework standard.

2.2 Service Consumer Components

- Controlpoint: The controlpoint represents the main component on the client side. It implements a UPnP Controlpoint. Its purpose is to search for UPnP devices and services in the network and make them available to the user.

- EventListener: This Listener takes care of the synchronization on the client side. At the synchronization timestamps, when new content becomes available, the EventListener is notified by event messages from the iTV service. Depending on the type of event, a reaction will be released e.g. a notification will be shown to the user.

3. CONCLUSION

The iTV platform presents an easy way for providing synchronous TV add-on services and interactivity on mobile personal devices. The UPnP standard makes it easy to extend the iTV platform with other services like remote control functionalities or recommendation systems. We will present two showcases - the "quiz-show scenario" and the "news-ticker scenario" - to demonstrate the capabilities of the prototypical implementation. A preliminary version of the platform has been successfully presented on the CeBit 2007 in Hannover and on The Siemens AG CT/IC Day 2005 in Munich.

4. REFERENCES

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